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SMUFD D/A ltr, 14 Feb 1972

TRANSLATION NO. 1238

DATE: 2 Dec 1964

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DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

# VIRUS NECROSIS OF TOBACCO VEINS

(Following is a translation of an article by Dr. Jan Berbec of the Institute for Cultivation, Fertilization, and Pedology in Pulawy, in the Polish-language periodical Ochrona Roslin (Protection of Plants), No. 7, Warsaw, Poland, 1964, pp 14 -- 17)

Virus necrosis of tobacco veins (browning of tobacco veins) occurs all over Poland and causes major economic losses. The author observed this disease in Poland on Kentucky tobacco about in the middle of the fifties.

In 1959 -- 1960 the disease appeared on a large scale in almost all areas where tobacco is cultivated, and it caused great damage. The brands which suffered in particular were Virginia Joyner, V. Skronlowska, Kentucky, and Pulawski Szerokolistny (broad-leafed Pulawy tobacco). Due to great losses in terms of the amount of product as well as quality of the raw material, the Association of Tobacco Industry was forced to limit the cultivation area of these varieties.

Studies of a number of orders show that the necrosis of tobacco veins is caused by a virus (~~VNNT~~ = $Y^N$), which belongs to the group of potato virus Y (Solanum virus 2).

Under natural conditions, the virus is transferred most frequently by peach-tree lice (Myzoides persicae) and potato lice (Aphis rhamni). Mechanical innoculation (stroke) of healthy plants by the sap of diseased plants can also result in an infection, and that increases the possibility of spreading the disease.

Virus necrosis of tobacco veins is not transferred by seeds. It hibernates in bundles of potatoes, but not all varieties of potatoes are carriers of the virus.

## Symptoms of the Disease

Under natural conditions, the disease appears in Poland in tobacco as a rule in the second half of June and



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during the following months. When the weather is favorable, the disease assumes the character of an epidemic.

The symptom of the disease at the beginning is a brightening of the veins of the leaves (Fig. 1), which is soon followed by a necrosis ( dying of the veins). In some varieties the leaves also become brown and dry while the veins continue to die (Fig. 2). In most of the varieties the leaves shrink while the disease is in process. The shrinkage is usually isometric, with characteristic bending downwards (drooping), which is due to the fact that the lower part of the veins dies faster than the upper part.

The disease affects all leaves of the plants. The form of diseased plants changes, and as a result, the plants lose the characteristics of their variety (Fig. 4). The most typical symptoms of the disease appear on the varieties of Virginia and Kentucky.

During long periods of hot weather, the symptoms of the disease are frequently concealed, and only when the weather gets cooler the symptoms become more pronounced. This is related to the concentration of the virus in the sap of the cells. As a result, the extent of damage caused by an epidemic of the disease depends on the temperature pattern during the summer.

The disease causes considerable losses in terms of the volume and quality of tobacco. For that reason the leaves of diseased plants should be gathered immediately when the first symptoms appear, because their value is small when they are harvested later on. In the case of cigarette varieties which are dried by heating pipes, the diseased leaves are particularly difficult to dry, and they produce raw material which has a heterogeneous brown color (Fig. 3). The disease does not affect so badly the coloring of the dried leaves as in the case of light cigarette tobacco.

## Resistance of the Varieties

Observations of a number of authors show that with regard to species of Nicotiana tabacum there is a great differentiation of the varieties from the point of view of their susceptibility to necrosis of the veins of the leaves. For example, it has been established that the varieties of Virginia and Kentucky are particularly susceptible to necrosis, while cigar varieties (Havana) are generally very resistant.

Some authors believe that the so-called resistant varieties are tolerant with regard to the virus, and although they do not show symptoms of the disease, nevertheless they represent a source of infection with regard to varieties which are susceptible to the disease, i.e. which are not tolerant. On the other hand, other authors claim that in a species of Nicotiana tabacum there are also varieties which are resistant to infection, in addition to varieties which are resistant to the disease.

Among the varieties of tobacco which are cultivated at present in Poland, the following show considerable resistance to the disease: Virginia Kasnowskiego, Zlotolistny IHAR, Mocny Skroniowski, and Havana II$^{c}$.

The resistance of the varieties of cultivated tobacco to virus necrosis of the veins is a hereditary, recessive characteristic. By crossing varieties which have no resistance with those which resist the disease, we can obtain new varieties which resist the disease. This is how the author cultivated the variety of Virginia Kaznowskiego and other varieties.

Among the wild species of Nicotiana, the following are characterized by their resistance to the disease: Nicotiana glauca, N. raimondi, and N. tomentosiformis. The disease is concealed to a considerable extent in the species of N. rustica, N. otophora, and N. paniculata. Certain species, including N. debneyi, N. alata, N. silvestris, show mosaic symptoms of the disease when infected by virus Y$^{N}$. Typical symptoms of necrosis of the veins of tobacco leaves are shown by the species N. glutinosa, N. sanderae, N. affinis, N. quadrivalvis, N. angustifolia, N. megalosiphon, N. bigelovii, and N. acuminata.

In addition to tobacco, many other species from the family of solanaceous plants are subject to the disease. Henbane (Datura stramonium) resist the disease.

## Preventive Means

The following must be done to reduce the damage caused by virus necrosis of tobacco veins: remove diseased plants which are a source of infection; destroy the lice on tobacco, weed, or shrubbery which grows wildly around the tobacco plantation; do not cultivate tobacco close to potato fields, tomato plantations, and other plants from the solanaceous family; limit cultivations of varieties which are susceptible to the disease, and replace them with varieties that are resistant.

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FIGURE APPENDIX

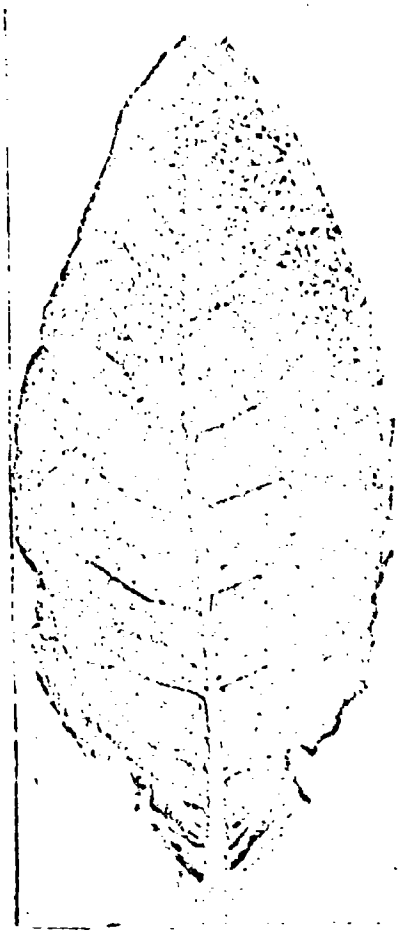

Fig. 1. Virus necrosis of tobacco veins ($Y^N$) -- Initial Symptoms. Pulawy 1959.

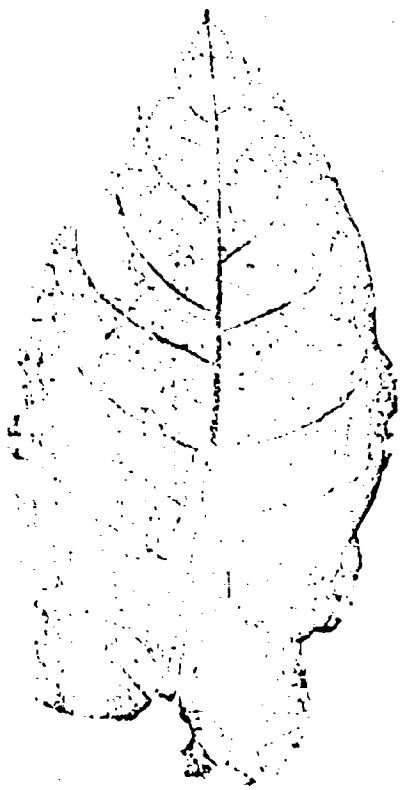

Fig. 2. Necrosis of tobacco veins ($Y^N$) -- Characteristic symptoms on the large-leaf variety. Pulawy 1959.

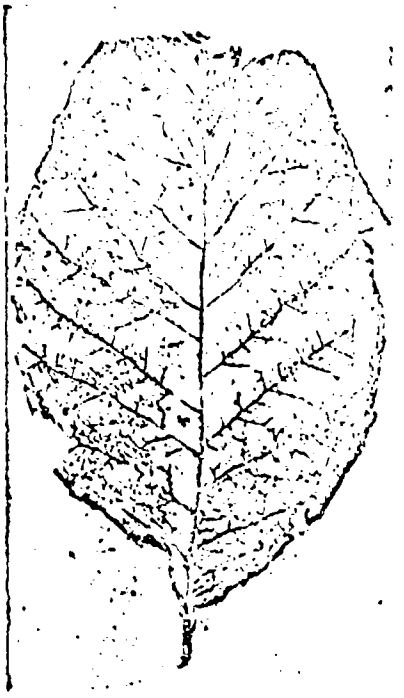

Fig. 3. Tobacco leaf which has been overcome by virus necrosis of veins ($Y^N$), after drying. Pulawy 1959.

Fig. 4. Kentucky tobacco -- plant with symptoms of virus necrosis of veins ($Y^N$). Pulawy 1959.